In the Claims:

Claims 1-13 (Cancelled).

14. (New) A positioning-controlling apparatus comprising:

a servo motor;

a servo driver for controlling an operation of said servo motor;

a rotary encoder for detecting an amount of rotation of said servo motor;

a moving mechanism driven by said servo motor so as to move an object;

a linear encoder for detecting an amount of movement of said moving mechanism; and

an origin sensor for detecting whether the object to be moved by said moving mechanism is located within a detectable region;

wherein said servo driver is operable to:

detect a commutation signal phase, from said rotary encoder, for driving said servo motor;

generate an electrical current instruction with rectangular waveform pulses based on the commutation signal phase from said rotary encoder until said rotary encoder detects a Z phase or until said linear encoder detects a Z phase;

after said rotary encoder detects the Z phase or said linear encoder detects the Z phase, generate an electrical current instruction with sine waveform pulses based on the detected Z phase, thereby switching a driving mode of said servo motor from rectangular waveform pulses to sine waveform pulses;

at a beginning or resumption of operation, control said servo motor so that said moving mechanism returns the object to an origin position corresponding to a position of the Z phase detected by said linear encoder; and

after the object is moved to the origin position, control said servo motor so that said moving mechanism moves the object to a required position and keeps the object at the required position; and

wherein, while said servo driver is controlling said servo motor so that said moving mechanism is returning the object to the origin position, and when said origin sensor first detects that the object is located within the detectable region, said linear encoder is operable to detect the Z phase only after said rotary encoder detects the Z phase.

15. (New) The positioning-controlling apparatus of claim 14, wherein while said servo driver is controlling said servo motor so that said moving mechanism returns the object to the origin position, and when said origin sensor first detects that the object is located within the detectable region, if said linear encoder encounters the Z phase before said rotary encoder detects the Z phase, said servo driver is operable to control said servo motor so that said moving mechanism moves the object in a forward direction out of the detectable region, and so that said moving mechanism then moves the object in a reverse direction back into the detectable region.

16. (New) The positioning-controlling apparatus of claim 14, wherein said servo driver is operable to control said servo motor so that said moving mechanism returns the object to the origin position by moving the object in a predetermined direction, said origin sensor, said rotary encoder, and said linear encoder being arranged so that said origin sensor first detects that the object is within the detectable region, then said rotary encoder detects the Z phase, and then said linear encoder detects the Z phase while the object is moved in the predetermined direction.

17. (New) The positioning-controlling apparatus of claim 16, wherein said servo driver is operable to control said servo motor so that said moving mechanism moves the object between a first end of a movable region and a second end of the movable region, said origin sensor being operable to detect whether the object is located within a detectable region having a first end and having a second end coinciding with the second end of the movable region, said rotary encoder and said linear encoder being arranged so that first said rotary encoder detects the Z phase and then said linear encoder detects the Z phase while the object is moved from the first end of the detectable region to the second end of the detectable region.

18. (New) The positioning-controlling apparatus of claim 16, wherein, when the object is outside of the detectable region at the beginning or the resumption of operation, said servo driver is operable to control said servo motor so that said moving mechanism returns the object to the origin position by moving the object in a predetermined direction.

19. (New) The positioning-controlling apparatus of claim 16, wherein, when the object is within the detectable region at the beginning or the resumption of operation, said servo driver is operable to control said servo motor so that said moving mechanism returns the object to the origin position by initially moving the object in a reverse direction opposite the predetermined direction so that said moving mechanism moves the object out of the detectable region, and then by moving the object in the predetermined direction so that said moving mechanism returns the object into the detectable region.

20. (New) The positioning-controlling apparatus of claim 14, wherein a position where said rotary encoder detects the Z phase and a position where said linear encoder detects the Z phase are spaced apart a predetermined offset amount, and wherein said servo driver is operable to control said servo motor so that said moving mechanism moves the object in a predetermined offset direction from the position where said rotary encoder detects the Z phase to the position where said linear encoder detects the Z phase, said servo driver being operable to stop generating an electrical current instruction with rectangular waveform pulses and begin generating an electrical current instruction with sine waveform pulses so as to switch the driving mode of said servo motor when the object is moved from the position where the rotary encoder detects the Z phase in the offset direction by the offset amount.

21. (New) A part-mounting system comprising:

a circuit-formed material-holding device for carrying and holding a circuit-formed material;

a part-supplying unit for supplying parts;

a mounting head operable to take a part out of said part-supplying unit and mount the part on the circuit-formed material held by said circuit-formed material-holding device;

a robot for carrying said mounting head; and

a controller for controlling said circuit-formed material-holding device, said part-supplying unit, said mounting head, and said robot such that the part taken out of said part-supplying unit by said mounting head is mounted on a predetermined mounting position of the circuit-formed material; and

wherein at least one of said robot and said circuit-formed material-holding device comprises a positioning-controlling apparatus for positioning the part at the predetermined mounting position of the circuit-formed material, said positioning-controlling apparatus including:

a servo motor;

a servo driver for controlling an operation of said servo motor;

a rotary encoder for detecting an amount of rotation of said servo motor;

a moving mechanism driven by said servo motor so as to move an object;

a linear encoder for detecting an amount of movement of said moving mechanism; and

an origin sensor for detecting whether the object to be moved by said moving mechanism is located within a detectable region;

wherein said servo driver is operable to:

detect a commutation signal phase, from said rotary encoder, for driving said servo motor;

generate an electrical current instruction with rectangular waveform pulses based on the commutation signal phase from said rotary encoder until said rotary encoder detects a Z phase or until said linear encoder detects a Z phase;

after said rotary encoder detects the Z phase or said linear encoder detects the Z phase, generate an electrical current instruction with sine waveform pulses based on the

detected Z phase, thereby switching a driving mode of said servo motor from rectangular waveform pulses to sine waveform pulses;

at a beginning or resumption of operation, control said servo motor so that said moving mechanism returns the object to an origin position corresponding to a position of the Z phase detected by said linear encoder; and

after the object is moved to the origin position, control said servo motor so that said moving mechanism moves the object to a required position and keeps the object at the required position; and

wherein while said servo driver is controlling said servo motor so that said moving mechanism is returning the object to the origin position, and when said origin sensor first detects that the object is located within the detectable region, said linear encoder is operable to detect the Z phase only after said rotary encoder detects the Z phase.

22. (New) The part-mounting system of claim 21, wherein one of said robot and said circuit-formed material-holding device includes a multi-axial driving unit for synchronous operation using a plurality of servo motors so that a respective one of said mounting head and the circuit-formed material can be carried in the predetermined direction.

23. (New) A positioning-controlling method comprising:

providing a rotary encoder for detecting a rotation amount of a servo motor;

providing a linear encoder for detecting an amount of movement of an object;

driving the servo motor according to a current instruction with rectangular waveform pulses based on a commutation signal phase from a rotary encoder until the rotary encoder detects a Z phase or the linear encoder detects a Z phase;

after the rotary encoder detects the Z phase or the linear encoder detects the Z phase, switching the driving mode of the servo motor to a driving mode according to a current instruction with sine waveform pulses based on the detected Z phase;

returning the object to the origin position corresponding to the position of the Z phase detected by the linear encoder, wherein while the object is being returned to the origin position, an origin sensor first detects that the object is within a detectable region of the origin sensor, and then the rotary detector detects the Z phase prior to detection of the Z phase by the linear detector within the detectable region; and

moving the object from the origin position to a required position.

24. (New) The positioning-controlling method of claim 23, wherein said returning of the object to the origin position includes moving the object in a predetermined moving direction, and includes arranging the origin sensor, the rotary encoder, and the linear encoder so that the origin sensor first detects that the object is within the detectable region, the rotary encoder then detects the Z phase, and the linear encoder then detects the Z phase after detection of the Z phase by the rotary detector, while the object is being moved in the predetermined moving direction.

25. (New) A part-mounting method comprising:

removing a part from a part-supplying unit;

regulating and holding a circuit-formed material using a holding device;

carrying the part to a mounting position of the circuit-formed material using a mounting head;

positioning the part at the mounting position; and

mounting the part at the mounting position;

wherein at least one of said regulating and holding of the circuit-formed material and said carrying and positioning of the part comprises a positioning-controlling method to position the part at the predetermined mounting position of the circuit-formed material, said positioning-controlling method including:

providing a rotary encoder for detecting a rotation amount of a servo motor;

providing a linear encoder for detecting an amount of movement of an object;

driving the servo motor according to a current instruction with rectangular waveform pulses based on a commutation signal phase from a rotary encoder until the rotary encoder detects a Z phase or the linear encoder detects a Z phase;

after the rotary encoder detects the Z phase or the linear encoder detects the Z phase, switching the driving mode of the servo motor to a driving mode according to a current instruction with sine waveform pulses based on the detected Z phase;

returning the object to the origin position corresponding to the position of the Z phase detected by the linear encoder, wherein while the object is being returned to the origin position, an origin sensor first detects that the object is within a detectable region of the origin sensor, and then the rotary detector detects the Z phase prior to detection of the Z phase by the linear detector within the detectable region; and

moving the object from the origin position to a required position.